

In The Drawings

Responsive to the October 16, 2007 office action, please substitute the enclosed 5 pages of formal drawings marked "Replacement Sheets" for the drawings previously submitted in the above-identified patent application. These drawings supersede all other drawings submitted for this file, and include changes to Fig. 6, addressing the examiner's objection regarding the word "MICROPROCESSOR." No new matter has been added.

Attachment: 5 Replacement Sheets of Drawings

REMARKS

Applicants appreciate the thoroughness with which the Examiner has examined the above-identified application. Reconsideration is requested in view of the amendments above and the remarks below.

Drawing objection

Applicant encloses formal drawings which include changes to Fig. 6 and address the examiner's objection regarding the word "MICROPROCESSOR." No new matter has been added.

Rejection under 35 USC § 103

Claims 1-3, 8, 9, 10, 12 and 16-18

Claims 1, 3, 8, 9, 10, 12, 16 and 18 stand rejected under 35 USC § 103 as being obvious from Robles et al. U.S. Patent Publication No. 2004/0005089 in view of Papadopoulou et al. U.S. Patent No. 6,178,539. Applicants respectfully traverse this rejection.

Applicants' invention employs the defined bisectors to create sub-resolution assist features between the adjacent ones of the spaced integrated circuit shapes. However, prior to creation of the sub-resolution assist features, it is important to create the Voronoi cells around the spaced integrated circuit shapes, and then create bisectors that define shared boundaries of adjacent Voronoi cells.

Applicants have amended claims 1, 10 and 16 to recite that the sub-resolution assist features (SRAFs) extend along the bisectors beyond an adjacent spaced integrated

circuit shape. Support is found, for example, in Fig. 4 wherein SRAF 108 extends along bisector 36 beyond adjacent integrated circuit shape 25b. No new matter is added.

The cited Robles reference does not make any mention of Voronoi cells, and does not use bisectors that define shared boundaries of adjacent Voronoi cells, or that extend beyond an adjacent spaced integrated circuit shape. Robles in Fig. 3 discloses a sub-resolution assist feature 335 centered between edges 330, 340 of respective features 310 and 320. SRAF 335 does not extend beyond either of those features 310 or 320. The corresponding description at paragraph 0017 states only that "edges 330 and 340 receive SRAF 335 centered between them." The SRAFs 355 that are beyond the edge 340 of the feature 320 are at "some predetermined distances 360 and 365" which are clearly not along the bisector between features 310 and 320.

As defined in the amended claims, applicants' sub-resolution assist features extend along bisectors (i.e., locus of points equidistant from edges of the adjacent spaced integrated circuit shapes defining shared boundaries of adjacent Voronoi cells), beyond adjacent spaced integrated circuit shapes. In the case of the type of features edges 330, 340 in Robles' Fig. 3, such bisectors would end in a one-dimensional (1D) fragmented vertex of the type shown in Fig. 3 of the instant application, and described in specification paragraph 0030. Where one edge ends at a point within the length of a parallel feature (as does the end of Robles' feature edge 340 with respect to feature edge 330), applicants' bisector would extend beyond the end of the edge that ends, as shown in applicants' Fig. 3 by vertex 156 that marks the end of bisector 150 that extends to the left of the end 142a of feature edge 143. Further, the SRAF may extend along such a bisector, as shown in Fig. 4 wherein SRAF 108 extends along bisector 36 beyond adjacent integrated circuit shape 25b.

Robles simply makes no mention of any bisector or SRAF that extends beyond his features 310 or 320. Robles in fact teaches away from applicants' invention since the SRAFs 355 that do extend beyond feature 320 are at distances other than the bisector between features 310 and 320.

The Papadopoulou patent does not remedy the deficiencies of Robles. The Papadopoulou patent does mention the use of Voronoi diagrams, but uses the diagrams to compute critical areas for shorts between different conducting regions of a layout. Papadopoulou does not use any boundaries of Voronoi cells to create sub-resolution assist features, as in applicants' claimed invention. Accordingly, one of ordinary skill in the art would not even look to combine the Robles and Papadopoulou references in the first instance.

Even if the references were combined, there is no suggestion in either Robles or Papadopoulou to create a bisector that comprises the locus of points equidistant from edges of the adjacent spaced integrated circuit shapes and defines shared boundaries of adjacent Voronoi cells, or to create a SRAF that extends along the bisectors beyond an adjacent spaced integrated circuit shape. Robles does not disclose or suggest a bisector or SRAF that extends beyond the end of a feature edge, as applicants claim. Papadopoulou does not disclose or suggest creating bisectors or SRAFs along shared boundaries of adjacent Voronoi cells. As such, one skilled in this art would not arrive at applicants' claimed invention from the hypothetical combination of these references. Applicants submit that claims 1, 10 and 16 are therefore not obvious from Robles in view of Papadopoulou.

Claims 4, 13 and 19

Claims 4, 13 and 19 stand rejected under 35 USC § 103 as being obvious from Robles in view of Papadopoulou and LaCour U.S. Patent Publication No. 2002/0155357. Applicants respectfully traverse this rejection.

Dependent claims 4, 13 and 19 add the subject matter of identifying different types of vertices for the bisectors prior to creating the sub-resolution assist features, and prioritizing creation of the sub-resolution assist features in accordance with the type of vertex.

LaCour mentions no "vertex" of a bisector, let alone a "bisector" as applicants' have defined. While LaCour does describe classifying scattering bars into priority groups, such classification has nothing to do with the type of vertices of bisectors, as applicants have defined. Therefore, claims 4, 13 and 19 would not be obvious to one of ordinary skill in the art.

Claims 5, 6, 14, 15 and 20

Claims 5, 6, 14, 15 and 20 stand rejected under 35 USC § 103 as being obvious from Robles in view of Papadopoulou and Lucas et al. U.S. Patent Publication No. 2004/0248016. Applicants respectfully traverse this rejection.

Dependent claims 5, 6, 14, 15 and 20 describe extending at least some of the sub-resolution assist features beyond the bisectors on which they are created, and extending at least some of the sub-resolution assist features beyond the bisectors on which they are created to connect to other sub-resolution assist features. Lucas has been cited to render obvious these methods.

Lucas makes no mention of extending sub-resolution assist features beyond bisectors as defined by applicants. Lucas does not disclose or suggest the extension of

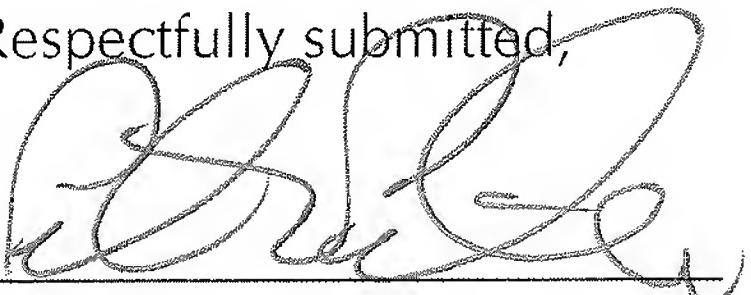
sub-resolution assist features along bisectors defined by shared boundaries of adjacent Voronoi cells. Lucas merely links sub-resolution assist features in a manner unrelated to applicants' claimed method. Accordingly, there is no disclosure of applicants' claimed method in the combination of Robles and Lucas.

Claim 7

Claim 7 stands rejected under 35 USC § 103 as being obvious from Robles in view of Papadopoulou and Frankowsky U.S. Patent Publication No. 2002/0182523. Applicants respectfully traverse this rejection.

Dependent claim 7 recites removing at least one of the sub-resolution assist features along the bisectors prior to finalizing the photomask layout. Frankowsky does not disclose or suggest the removal of sub-resolution assist features along bisectors defined by shared boundaries of adjacent Voronoi cells. Frankowsky merely removes scatter bars in a manner unrelated to applicants' claimed method. Therefore, there is no disclosure of applicants' claimed method in the combination of Robles and Frankowsky.

It is respectfully submitted that the application has now been brought into a condition where allowance of the entire case is proper. Reconsideration and issuance of a notice of allowance are respectfully solicited.

Respectfully submitted,

Peter W. Peterson
Reg. No. 31,867

DeLIO & PETERSON, LLC
121 Whitney Avenue
New Haven, CT 06510-1241
(203) 787-0595
ibmf100418000amdB-AF.doc